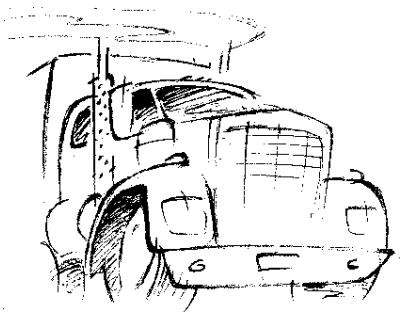
Particulate matter from diesel-fueled engines

On August 27, 1998, the Air Resources Board (ARB) identified particulate emissions from diesel-fueled engines as a toxic air contaminant (TAC). This ended a near decade-long scientific investigation into the health effects of exposure to the fine particles and other pollutants in diesel exhaust. The decision was based on a comprehensive report prepared by the ARB and Office of Environmental Health Hazard Assessment and reviewed by an independent Scientific Review Panel.

The ARB has now begun an open public process to evaluate the need, feasibility and cost of control to further reduce the public's exposure to organic gases and particulate matter emissions from diesel-fueled engines.

To help identify additional opportunities to reduce TAC emissions from diesel-fueled engines, the ARB has formed an Advisory Committee composed of interested industries, associations, environmental groups, other governmental agencies such as the U.S. Environmental Protection Agency (U.S. EPA), local air districts, and other interested parties. Subcommittees formed include Stationary Source, Fuels, Mobile Sources, Alternative Strategies, and Risk Management.

Prior to the TAC identification, the ARB had already adopted control measures to reduce particulate emissions from diesel-fueled engines to help meet PM_{10} (particulate matter equal to or less than 10 microns in diameter) standards. Due to these measures, the outdoor ambient air concentration of PM_{10} in California associated with diesel-fueled engine emissions is projected to decrease by about 40 percent by 2010.



Emissions from diesel-fueled engines currently include over 40 substances that are listed by the U.S. EPA as hazardous air pollutants and by the

Diesel exhaust facts

- Diesel-fueled engines emit a complex mixture of thousands of gases, vapors, and fine particles. These contain potential cancer-causing substances such as arsenic, benzene, formaldehyde, nickel, and polycyclic aromatic hydrocarbons.
- Almost all of the diesel particles are in the fine particle range of PM_{10}, and, as a result, are small enough to be inhaled deep into the lungs.
- Approximately 27,000 tons of PM_{10} from diesel-fueled engines are emitted into California's air each year.
- Heavy-duty diesel vehicles make up only 2 percent of the motor vehicle fleet, but emit over 30 percent of the nitrogen oxides and over 55 percent of the particulates from vehicles.

Health Risks

- Research shows that:
  - Emissions from diesel-fueled engines may cause cancer in animals and humans;
  - Workers exposed to higher levels of emissions from diesel-fueled engines are more likely to develop lung cancer; and
  - There is a link between emissions from diesel-fueled engines and non-cancer damage to the lung.
- In 1990, the State of California, under Proposition 65, identified diesel exhaust as a chemical known to cause cancer.
- The International Agency for Research on Cancer concluded that diesel engine exhaust probably causes cancer in humans.
- The U.S. EPA has proposed classifying diesel exhaust as a probable human carcinogen.

Existing Control Measures

The ARB has already adopted many regulations that are reducing particulate matter, NOx, and sulfur oxides (SOx) emissions from diesel-fueled engines. These include:

- A requirement for low sulfur/low aromatic diesel fuel that reduces particulate matter, NOx, and SOx emissions (October 1993);
- Emission standards that restrict the amount of particulate matter emitted by new diesel cars, trucks, urban buses, and heavy-duty trucks (phased-in from 1982 through 1996);
- Emission standards for NOx emissions from diesel cars, trucks, and urban buses (phased in from 1984 through 2004);
- The roadside testing of heavy-duty on-road vehicles for excessive particulate matter emissions (1991) and a requirement for fleet inspection and maintenance of heavy-duty vehicles (summer 1998); and
- Emission standards that restrict the amount of particulate matter and NOx that can be emitted from many 1995 and newer diesel utility engines.

Planned Control Measures

In the near future, several other programs will bring further reductions of diesel exhaust particulates:

- A proposed requirement to use low sulfur/low aromatic diesel fuel in locomotives;
- A $25 million incentive program (the Carl Moyer Program) to reduce TAC emissions from heavy-duty diesel-fueled engines by providing grants for the incremental cost of lower-emission engines (Grants will be available starting in Summer 1999. Contact your local air pollution control district for details.); and
- Federal funding for cleaner urban buses through the Transportation Equity Act for the 21st Century.

Possible Future Control Measures

If, after considering existing and planned programs, cost-effective additional measures are identified to reduce further public exposure to TAC emissions from diesel-fueled engines, such measures will be developed in a public process that allows for full participation by all interested parties. Additional strategies that may be considered during the needs assessment include:

- Reducing emissions from new diesel-fueled engines
    - PM standards for on-road diesel-fueled engines
    - PM standards for cars and light-duty trucks
    - PM standards for off-road diesel-fueled engines
    - Further diesel fuel reformulation
- Maintaining low emissions during the life of an engine
    - Educational programs for truck owners and operators, service technicians, and engine mechanics
    - Additional in-use compliance programs to include testing and recall of heavy-duty trucks
- Incentive programs to accelerate turnover of in-use equipment and increase the use of alternative fuel technologies

For more information

Please contact the ARB toll-free at (800) END-SMOG (California only) or (800) 242-4450 (outside California).

You may obtain this document in an **alternative format.** Contact ARB's ADA Coordinator at: (916) 322-4505 (voice); (916) 324-9531 (TDD, Sacramento area only); or (800) 700-8326 (TDD, outside Sacramento).